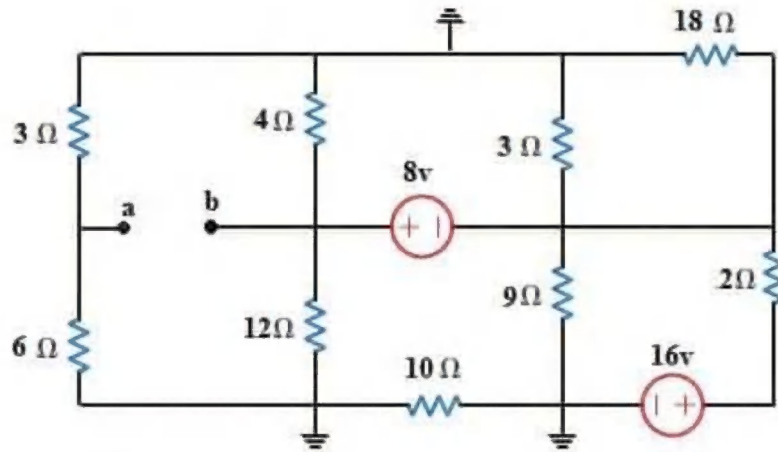Using Simple Circuit Analysis, Find P_{8v} and V_{ab}

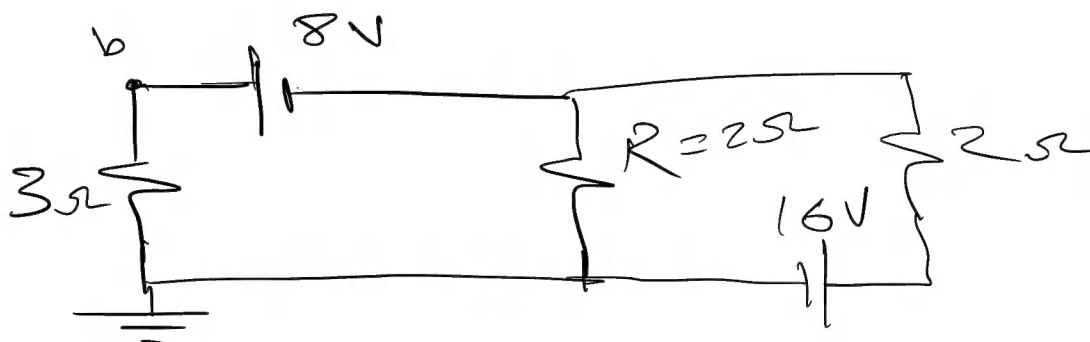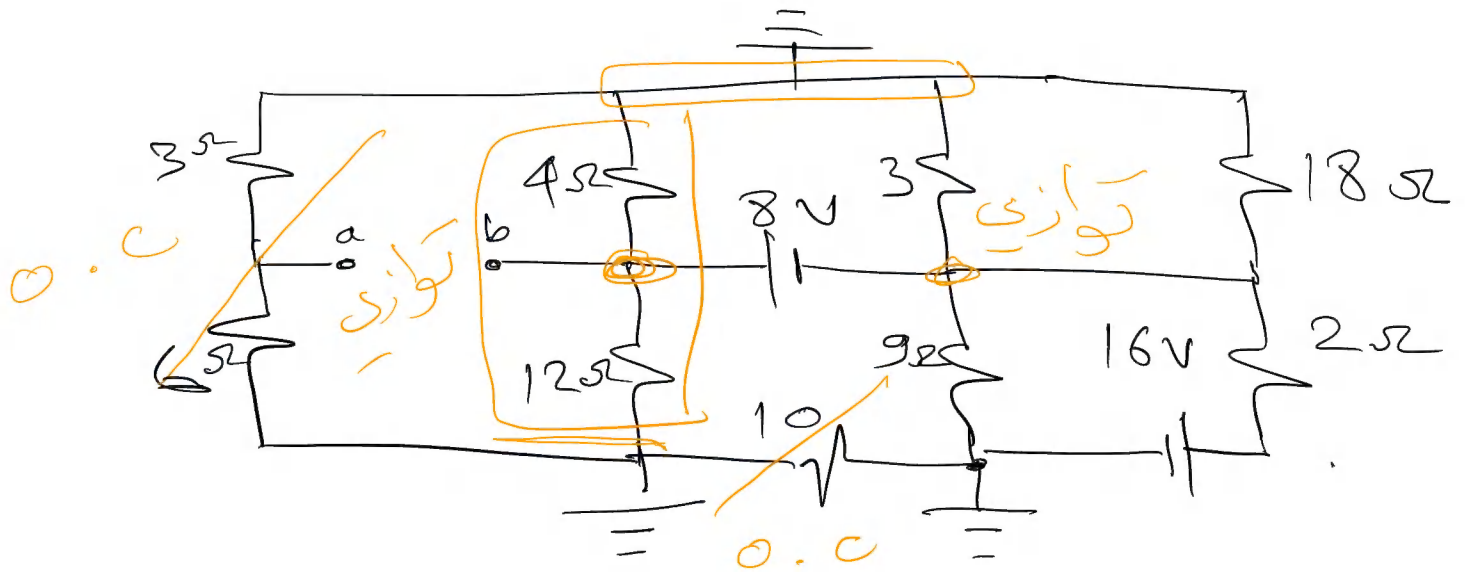Ans:

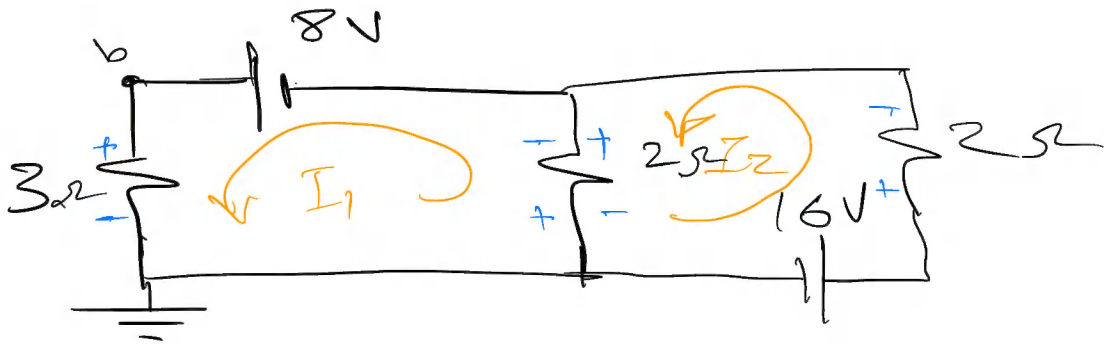$P_{8v} = 32 \text{ w}$ $V_{ab} = 12 \text{ v}$ Eng. M.Drebika

حل باستخدام التوازي والتوالي و KVL

و KCL #

$$\frac{1}{R} = \frac{1}{3} + \frac{1}{9} + \frac{1}{18} = \frac{6+2+1}{18} = \frac{9}{18}$$

$$R = 2 \, \Omega$$

$$8 - 3I_1 - 2(I_1 - I_2) = 0$$

$$8 - 5I_1 + 2I_2 = 0$$

$$5I_1 - 2I_2 = 8 \quad \underline{\qquad} \quad ①$$

$$16 - 2I_2 - 2(I_2 - I_1) = 0$$

$$16 - 4I_2 + 2I_1 = 0$$

$$2I_1 - 4I_2 = -16 \quad \underline{\qquad} \quad ②$$
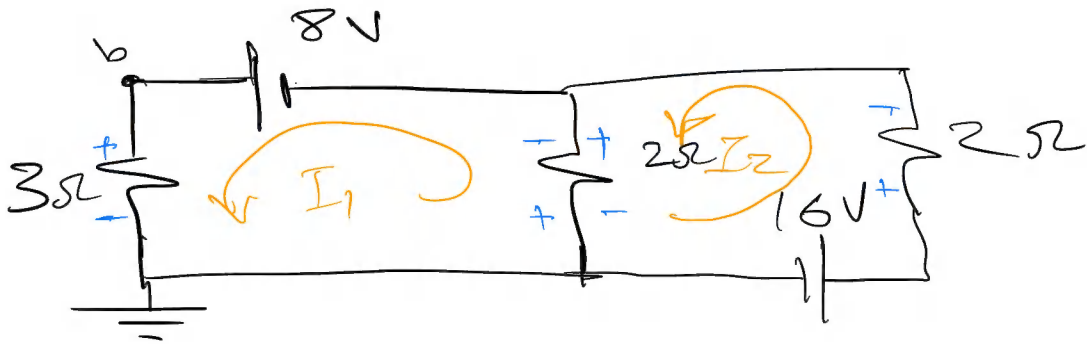
$$I_2 = \frac{2I_1 + 16}{4}$$

② منو

① في نعوض التشغيل

$$5I_1 - 2\left(\frac{2I_1 + 16}{4_2}\right) = 8$$

$$5I_2 - \frac{2I_1}{2} - \frac{16}{2} = 8$$

$$4I_1 - 8 = 8$$

$$I_1 = \frac{16}{4} = 4A$$

$$\boxed{P_{8V} = 8I_1 = 8 \times 4 = 32 \; W}$$

$$V_b = 3I_1 = 3 \times 4 = 12V$$

$$V_{ab} = V_a - V_b = 0 - 12$$

$$\boxed{V_{ab} = -12V}$$